Using Carbon-Based Nanomaterials and Microscale Geometry for Enhanced Thermionic Energy Conversion in Space Applications

Completed Technology Project (2013 - 2017)

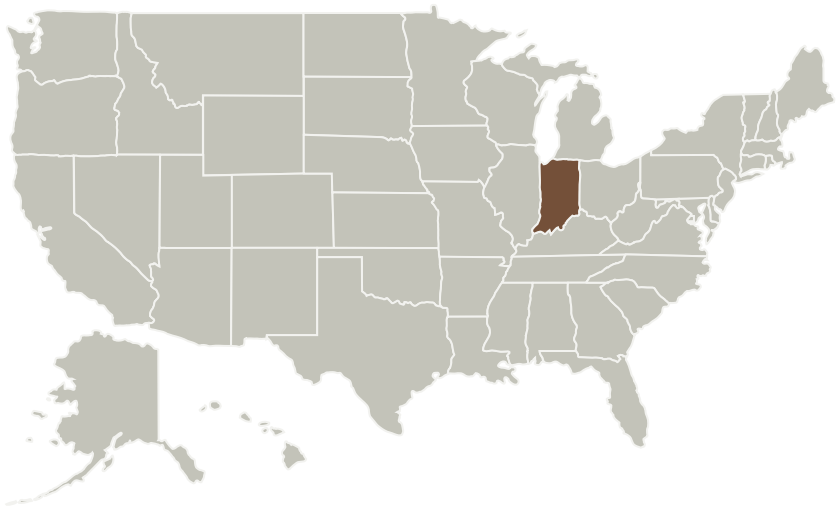
Project Introduction

The hypothesis of this research is that using carbon-based nanomaterials (CBN) electrodes in a microscale thermionic energy conversion (TEC) device operated at modest pressures will increase both the power density and conversion efficiency of TEC devices. For this NASA Fellowship, I will work to improve the performance of thermionic energy converters for space applications by investigating the fundamental physics of CBN-enhanced microscale thermionic energy conversion. I will focus my research efforts on the development and characterization of CBN as thermionic emitters, the development of microscale TEC devices, and the prediction of CBN-enhanced microscale TEC using particle-based simulation models. This work will increase the understanding of the complex interaction between ions and thermionic emission, and push them further toward the development of functional TEC devices.

Anticipated Benefits

This work will increase the understanding of the complex interaction between ions and thermionic emission, and push them further toward the development of functional thermionic energy conversion (TEC) devices.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
University of Notre Dame(Notre Dame)	Lead Organization	Academia	Notre Dame, Indiana

Primary U.S. Work Locations
Indiana

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

University of Notre Dame (Notre Dame)

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

David Go

Co-Investigator:

John R Haase

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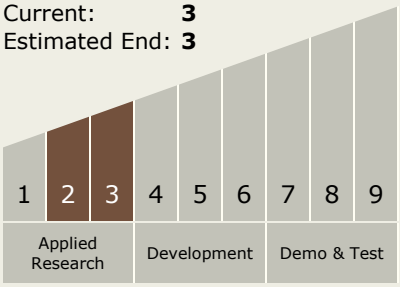
Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.3 Static Energy Conversion

Target Destinations

Mars, Others Inside the Solar System